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Patent Number: US5316793

Publication date: 1994-05-31

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Requested Patent: JP6224138

Application Number: US19920919685 19920727

Priority Number(s): US19920919685 19920727

IPC Classification: C23C16/00

EC Classification: C30B25/14, C23C16/455

EC Classification: C30B25/14; C23C16/455

Equivalents:

Abstract

A system and method for epitaxial growth of high purity materials on an atomic or molecular layer by layer basis wherein a substrate is placed in an evacuated chamber which is evacuated to a pressure of less than about 10⁻⁹ Torr and predetermined amounts of predetermined precursor gases are injected into the chamber from a location in the chamber closely adjacent the substrate to form the atomic or molecular layer at the surface of the substrate while maintaining the pressure at less than about 10⁻⁹ Torr in the chamber in regions thereof distant from the substrate. The precursor gases are provided from a plurality of tanks containing the precursor gases therein under predetermined pressure and predetermined ones of the tanks are opened to the chamber for predetermined time periods while maintaining the pressure in the tanks. A dose limiting structure is provided for directing predetermined amounts of the precursor gases principally at the substrate with a dose limiting directional structure.